

Application No. 09/038,230  
Response Under 37 CFR 1.116  
Expedited Procedure  
Examining Group 1712  
Amdt. AF dated May 29, 2003  
Reply to Final Office Action of January 29, 2003  
Attorney Docket No. 1217-980347

### **REMARKS**

Claims 1 and 5 are pending in the instant application. Claim 1 has been amended to indicate how the silica containing composite oxides are prepared. Support for the amendment of claim 1 is found on page 6, lines 3 - 6 of the specification.

Reconsideration is respectfully requested in light of the above amendment of claim 1 taken with the following remarks.

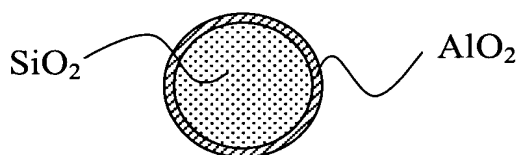
Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by WO 97/00995 to Minnesota Mining and Manufacturing Company (3M) (hereinafter "3M") and as being anticipated by United States Patent No. 3,689,300 to Bunger et al., (hereinafter "the Bunger patent"). Claim 1 has been amended to indicate that the "the silica containing composite oxides are produced by simultaneously adding an alkali metal silicate, such as sodium silicate, and an alkali soluble inorganic compound to an alkali aqueous solution." The present invention's particle has a homogeneous structure of silica with another metal dispersed throughout when made using the recited method. The prior art's particle has a silica core with an alumina outer shell. The method included in amended Claim 1, described in the specification, provides homogeneous (on p. 6, lines 3-6) composite oxide particles since "the silica containing composite oxides are produced by simultaneously adding an alkali metal silicate, such as sodium silicate, and an alkali soluble inorganic compound to an alkali aqueous solution." By simultaneously adding the two compounds a homogeneous composite oxide particle is created.

3M discloses a fluorochemical treatment composition comprising

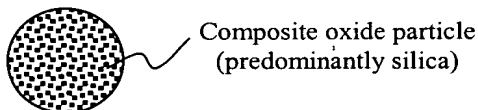
(a) a sol comprising a colloidal dispersion of substantially discrete, substantially monodisperse in size, polymer-grafted, inorganic microparticles in liquid; and

(b) at least one fluorochemical.

3M (pages 25 to 26) discloses coupling agent-treated silica sols and defines the sol P-4 as surface-treated silica sols and defines the sol P-4 as surface treated NALCOAG 1056, which is a colloidal silica core with an  $\text{Al}_2\text{O}_3$  shell ( $\sim 4\% \text{ Al}_2\text{O}_3$ ) suspension having a mean particle size of 20 nm and 30% solid content in water having a pH of 4.2. That is, the surface of the particle used in 3M is composed of alumina. (See the sectional view of the following figure.) Furthermore, the particle in 3M has a core-shell structure.



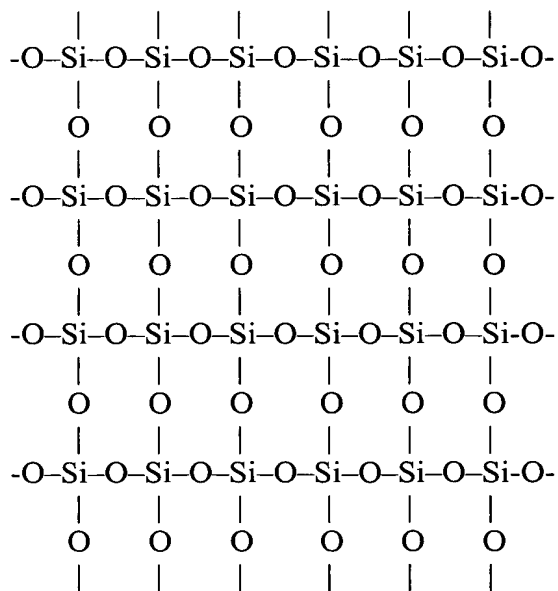
In contrast, the composite oxide particle (pictured below) used in the present invention has a ratio of silica to at least one inorganic oxide other than silica of from 5 to 300. (That is, the composite oxide particle is a silica-rich particle.)



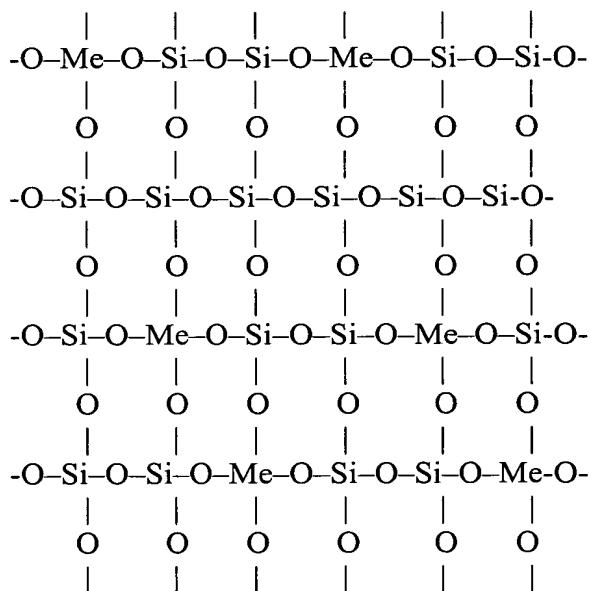
The surface of the particle used in the present invention is composed of the composite oxide (predominately silica). Furthermore, the composite oxide particle used in the present invention is a homogeneous composite oxide particle and does not have a core-shell structure.

For example, the composite oxide particle used in the present invention is prepared by simultaneously adding the alkali metal, ammonium, or the silicate of an organic base, and an alkali soluble inorganic compound in an alkali solution of a pH of 10 or higher in order to generate the colloidal particle which consists of silica and inorganic oxides other than a silica.

It is well known that silica ( $\text{SiO}_2$ ) is a macromolecule in which the tetrahedron of  $\text{SiO}_4$  is infinitely and three-dimensionally connected through the covalent oxide molecules. Schematically, the structure of  $\text{SiO}_2$  is shown as follows.



In silica, there are no metals dispersed throughout the molecular matrix. The composite oxide particle in the present invention has a metal dispersed throughout the structure. Schematically, the structure of the present composite oxide particle is shown in the figure below. (Me is a metal other than Si).



Therefore, the composite oxide particle used in the present invention is different from that used in 3M.

As discussed in the prior response, dated November 12, 2002, 3M does not disclose the step of displacement of water that is taught in the present invention. Therefore, the sol obtained in the present invention is different from that of 3M. Since the purpose of the present invention is different from that of 3M, the process producing the sol in the present invention is also different from that of 3M. It is not necessary for the sol of 3M to displace the water to the specific solvent. By the displacement of

solvent, the electrolyte content is lowered; thereby a stable sol can be produced. This effect is not shown in 3M. Accordingly, the present invention cannot be anticipated by 3M. Therefore, the rejection of claims 1 and 5 under 35 U.S.C. § 102(b) over 3M should be withdrawn.

Example 1 of the Bunger patent discloses methacrylpropyltrimethoxysilane treated silica sols, which are a suspension of colloidal silica (26% SiO<sub>2</sub>) modified with an Al<sub>2</sub>O<sub>3</sub> shell (~4% Al<sub>2</sub>O<sub>3</sub>) in which the particles have a mean particle size of 16 nm; the sol being homogeneous, having a 30% solids content in water and having a pH of 4.7. That is, the surface of the particle used in the Bunger patent is composed of alumina. Therefore, the composite oxide particle used in the present invention, which has a homogeneous structure, is different from that used in the Bunger patent.

The Bunger patent does not disclose the step of displacement of water that is taught in the present invention. Therefore, the sol obtained in the present invention is different from that of the Bunger patent. Accordingly, the present invention cannot be anticipated by the Bunger patent. For the reasons stated above, the rejection of claims 1 and 5 under 35 U.S.C. § 102(b) over the Bunger patent should be withdrawn.

Claims 1 and 5 stand rejected under 35 U.S.C. § 103(a) for purported obviousness over United States Patent No. 5,935,700 to Enomoto et al. ("Enomoto") in view of United States Patent No. 5,316,714 to Yoneda et al. ("Yoneda"). As described in the previous Response dated November 12, 2002, Enomoto does not teach the particular

silane coupling agent and content thereof as in the present invention. Indeed, among the exemplified coupling agents, only glycidoxypyltrimethoxysilane and vinyltrimethoxysilane fall within the scope of the present invention.

First of all, Enomoto aims at raising the lipophilicity of an inorganic particle and raising affinity with a thermoplastic resin. On the other hand, the present invention's aim is to obtain stable dispersed particulates in sol or solution even if acids, alkalis, or surfactants are present. As a result, for example, the inorganic sol of the present invention is useful for cement additives aimed to stop water or soil strength. When the inorganic sol of the present invention is added to cement, excessively quick caking of the cement is retarded because of a low gelation rate, and the inorganic compound sol can easily fill up crevices between the solid and moles. For this purpose, the specific compound modifies the surface of the particulate in the sol in the present invention.

As described in Enomoto, merely by modification using common modifiers, the particulates do not always exhibit suitable stability in sol or solution in the presence of acids, alkalis, or surfactants.

As described in the prior Response dated November 12, 2002, Enomoto does not teach the particular silane coupling agent of the present invention. Yoneda discloses numerous coupling agents including those used in the present invention. However, Yoneda does not teach or suggest the specific selection of the coupling agent having the specific molecular polarizability.

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Indeed, among the exemplified coupling agents, only glycidoxypolytrimethoxysilane and vinyltrimethoxysilane fall within the scope of the present invention. Yoneda exemplifies methyltrimethoxysilane (column 7, line 29) as the coupling agent. As can be seen from Comparative Example 2 in the present specification, an inorganic compound sol modified by methyltrimethoxysilane demonstrates inferior dispersion stability. Thus, Yoneda does not provide reasonable motivation to select the above coupling agent. Accordingly, the combined teachings of Enomoto and Yoneda do not render present invention obvious.

Additionally, one of the present inventors, Hiroyasu Nishida, is a named inventor in the Enomoto patent. A Declaration under 37 C.F.R. § 1.132 by Mr. Nishida is attached hereto, indicating that he conceived of the subject matter disclosed but not claimed in the Enomoto patent and claimed in the present application. Additionally, the Enomoto patent and the present application are both assigned *in toto* to Catalysts & Chemicals Industries Co., Ltd. Therefore, the Enomoto patent is not an invention by another and must be withdrawn as a prior art reference.

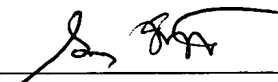
For the all of the reasons stated above, the rejection of claims 1 and 5 under 35 U.S.C. § 103(a) over Enomoto in view of Yoneda should be withdrawn.

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In view of the above, it is submitted that the claims are patentable over the prior art of record and are in condition for allowance. Reconsideration of the rejections and allowance of claims 1 and 5 are respectfully requested.

Respectfully submitted,

By

  
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